

High Performance Iodine Feed System, Phase I

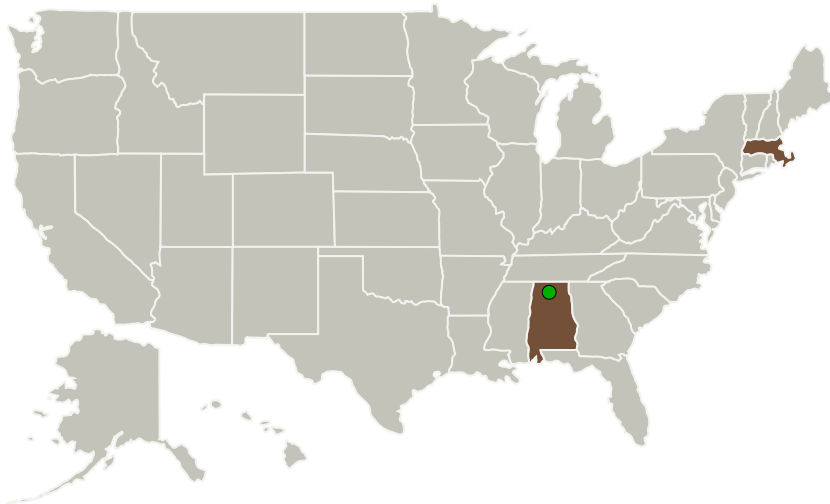
Completed Technology Project (2015 - 2015)



Project Introduction

The proposed innovation is an advanced iodine feed system for Hall Effect Thrusters (HETs), ion engines, cathodes, and other plasma generators. This feed system features a low mass plastic propellant tank that may be manufactured through additive processes. This allows low cost, complex shapes that can maximize the use of available space inside the spacecraft. The feed system also features an innovative piezo valve that will save volume, mass, cost, and energy with respect to the state of the art alternative for iodine. Iodine stores as a solid and sublimates as the molecule I_2 , which allows many benefits with respect to traditional Hall Effect Thruster fuels such as xenon and krypton. These advantages include higher storage density, lower storage pressure, the ability to test high power systems at space-relevant conditions in modest facilities, the capability to store propellant in space without active regulation, and the capacity to transfer propellant at low pressure conditions in space. In a space-limited spacecraft, the use of iodine instead of state of the art xenon could increase available delta V by a factor of 3 or more. Iodine is especially beneficial for small CubeSat sized spacecraft. In Phase I, Busek will design a feed system featuring the new, advanced components. The system will then be demonstrated with an iodine fueled thruster in space relevant conditions. In Phase II, an improved feed system will be designed, built and tested.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Massachusetts
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Project Transitions

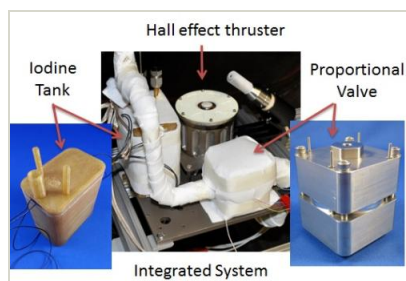
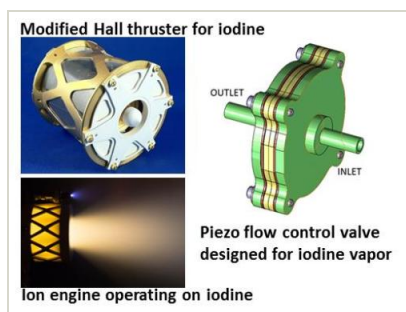
▶ **June 2015:** Project Start

✓ **December 2015:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138922>)

Images



Briefing Chart

High Performance Iodine Feed System Briefing Chart
(<https://techport.nasa.gov/image/132352>)

Final Summary Chart Image

High Performance Iodine Feed System, Phase I Project Image
(<https://techport.nasa.gov/image/130940>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Busek Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James Szabo

Co-Investigator:

James Szabo

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Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System